



Conceptual Model of the Mission Space (CMMS) Technical Framework

Technical Framework Gang-of-Five

- Bailey, Haddix, Might, Sheehan, and Weller
- Hopkins for Data Interchange Format

Direct Input from Major M&S Programs

- JSIMS/JWARS, STOW-97, CCTT/WarSim-2000, NASM, BFTT/JTCTS/NSS/Emerald-Light, ALSP, ...

Compose Technical Framework

- CMMS Process
- Common Concepts Required to Break the Stovepipe
- Implementation Agreements for Interoperability



Authoritative Representation

Organization	Military Prob.	CS Schema	Data Engr.
DMSO	Conceptual Model of the Mission Space (CMMS)	High Level Arch. (AMG HLA), EXCIMS Object Model	Simulation Data Engineering (SDE)
STOW-97 OpenSAF	Knowledge Acquisition (KA)	Knowledge Engineering (KE)	(not yet, DE)
Maritime Operations	Naval Warfare Publications (NWP)	JMCIS-Common Operating Env.t (COE)	Naval Warfare Tactical Database (NWTDB)
CJCS 6111.01	Operational (AOR, Mission Specific)	Systems (Resources, Connectivity)	Technical (TAFIM, Standards)



Technical Framework Approach

- **Technical Framework is an OMG Style Standards Process Requirements/Specifications with a Prototype**
- **Crawl, Walk, Run Approach**
 - **Crawl -- Least Common Denominator**
 - **Walk -- Pair-Wise Interoperability**
 - **Run -- Full Compatibility**
- **Socialize the Message**
 - **Direct Contact with the Major M&S Developers**
- **Vote with Your Feet**
 - **Provide Multiple Tools/Approachs
CMMS Prototype, FDB, JMSM, KA/KE, ...**
 - **End Users Select De Facto Standards**



Core Mission Space Concepts

- **Hierarchical Planning and Execution Structures**
- **Primitives Derived from Unifying Principles**
- **Mission Space Distinctions at the Same Level of Abstraction**



Hierarchical Planning and Execution Structures

- **The real world operates as a continuum of ultimate complexity.**
- **Actual military activities adapt to this complexity by distributing the responsibility for planning and execution of real operations across discrete, hierarchical command and control structures.**
- **There are unifying principles and processes which are imposed at every level of the command hierarchy**
- **There are sharp distinctions in level of abstraction and aggregation at which information is fused and actions are taken between distinct levels of the command hierarchy.**
- **CMMS should explicitly address both the unifying principles and the distinctions in abstraction in real military activities.**



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The Great Equalizer

- **All Men are Created Equal in the Sight of Shell Bursts**
- **All Abstractions Vanish at the Point of Impact**



Levels of Abstraction

	Live	Virtual	Constructive
Theater/Campaign	GCCS	NTF-TBMD	ITEM, NSS, CBS, AWS, RESA, ...
Mission/Battle	JMCIS	JMCIS Training Segment	NSS
System/Engagement	JTCTS	BFTT, CCTT	OpenSAF
Subsystem/Component	Emerald Light	ACTS, EW-OBT, SQQ-89-OBT, ...	Ordinance Server, IADS, ...



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Cover and Concealment

- **Concealment is Well Defined in all Warfare Areas**
- **Cover in Land Warfare has no Air and Sea Analogy**



Integration/Interoperability Progression

- **Oral History (Myth of the Black Box)**
 - **Concept -- Standard Language**
 - **Tool -- Data Dictionaries**
- **Natural Language Text (Complete Sentences)**
 - **Concept -- Whole Units of Meaning**
 - **Tool -- S3I RDD Interpreter, DRC UJTL Software**
- **Fully Structure Views (Regular Expression Grammars)**
 - **Concept -- Re-Usable Objects for a Common Use**
 - **Tool -- Metrics available, Tool to Enforce?**
- **Canonical Representation**
 - **Concept -- Re-Usable Object for Multiple End-Uses**
 - **Tool -- Database Concepts, Tool to Enforce?**



Common Software Architecture for Heterogenous Computing Systems

User Interface

- **Netscape/Mosaic, HTML, JAVA**
- **Microsoft Windows**

Distributed Objects

- **CORBA 2.0, COM**
- **Common Object Services (COSS)**
- **Common Object Facilities (COFAC)**

Database Management Systems

- **Open Database Connectivity (ODBC 2.0)**
- **Structured Query Language (SQL2)**
- **Object Database Management (ODMG-93)**